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ON ACETIC ACID AS A SUBSTITUTE FOR ETHYL ALCOHOL IN EXTRACTING THE ACTIVE PRINCIPLES OF SOME OFFICINAL DRUGS.

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FOURTH PAPER.

THE OFFICINAL VARIETIES OF RHAMNUS OF THE U.S.P.—RHAMNUS FRANGULA AND RHAMNUS PURSHIANA (BUCKTHORN AND CASCARA SAGRADA).

In selecting examples for a fourth paper on this subject it seemed best to take substances of wide common usage and general applicability, not dependent upon an alkaloid or upon any single or separable active principle, but rather on the total extractive matter of the drug. The bark of the two officinal varieties of the Rhamnus family fulfil these conditions very well, being used in the same way for the same purpose, and for that purpose only, namely, to correct and control the condition of constipation. Neither one is a proper purgative or cathartic, nor even a very good evacuant. Both are laxatives, while the buckthorn is the more simply laxative or relaxing, and the cascara is more actively evacuant. If both be classed as laxatives the buckthorn must be said to be the milder and more gentle in operation. For the proper and best effect both should be given in small doses after meals for a noticeable effect only on the second day.

The bark of Rhamnus Frangula or buckthorn has been long known and used professionally and popularly as a laxative throughout continental northern Europe, where the shrub is indigenous. The bark of young trunks and branches is used, and that of older

and larger trunks is avoided as being different in properties and effects. In common with the willow the wood of the branches was, and probably is still, used for making a charcoal for sportsman's gunpowder, and this secures the peeling of the proper quality of the bark at the proper season. The bark is carefully air-dried and not used until seasoned for at least a year.

Buckthorn was introduced into the materia medica of this country about 1868–70 by Dr. John P. Gray, the well-known alienist, who, for so many years, had charge of the New York State Lunatic Asylum at Utica, and who was killed there by the pistol-shot of one of his insane patients.

Returning from a professional visit to some of the European hospitals for the insane, he brought a bag containing a few pounds of buckthorn. Finding it rather inconvenient to use in decoction or in substance by chewing, as was the practice abroad, he brought the bag to this writer, who advised the form of a fluid extract, made it into a fluid extract for him, and soon after imported from Hamburg the first considerable lots that are known to have come to this country. By January, 1872, the bark and fluid extract were accessible in the markets and by 1880 had so increased in use as to be admitted to the U.S.P.

From that time to the present, without special advertising or effort and against an active competition with Rhamnus Purshiana, which has had much special advertising and effort, it has steadily increased in appreciation and use. For more information in regard to it see *Ephemeris*, Vol. III, No. 2, pp. 1045–1052, 1887.

The bark of Rhamnus Purshiana, cascara sagrada, was admitted to the U.S.P. in 1890. "Attention was first drawn to the virtues of this plant in 1878 by Bunday, of California."—National Dispensatory, Fifth Edition, 1894, p. 1375.

The shrub or small tree is indigenous to the Western coast of North America and seems to have been sometimes confused with other varieties of Rhamnus. See John W. Farlow, M.D., for a paper on "Cascara Sagrada, and its Use in the Treatment of Constipation," in the *Boston Medical and Surgical Journal* for October, 1887, p. 402. See also papers in the *Ephemeris*, Vol. III, pp. 984–1243, 1887.

This bark, under the name cascara sagrada, or simply cascara, is now a large article of commerce here and is exported in very

considerable quantities, showing a very large and general usage. As found in the markets it varies much in quality and price, the variation consisting chiefly in the differing proportions of old and thick bark. It is believed on good authority that the effect of the bark of trunks and old branches is different in kind from, as well as inferior in degree to, the younger and thinner bark, and therefore preference is given to those lots that have the smallest proportion of old thick bark. But as lots, and bales in the same lot, differ much, it is difficult to get a succession of lots of fairly uniform quantity, even with the screw of price taken off. In this respect cascara is very different from buckthorn (Frangula), which is fairly uniform in quality.

For a close comparison of the use of the officinal alcoholic menstruum with the 10 per cent. acetic acid menstruum, two portions of 500 grammes each of each variety of Rhamnus were carefully and accurately made into as many portions of 500 c.c. each of fluid extract by the officinal process, the rate and degree of exhaustion noted and compared in a table, and then the finished results compared.

First for the U.S.P. process and product, 500 grammes of buckthorn (Frangula), in No. 40 powder, was moistened with 225 c.c. of a mixture of five volumes of alcohol (91 per cent.) and eight volumes of water, firmly packed, filled with menstruum, macerated for forty-eight hours and then percolated slowly.

The percolate was received in successive fractions of 100 c.c. each, each fraction weighed and the weight of 100 c.c. of the menstruum subtracted, to get the series of differences.

Next for a parallel process with a 10 per cent. acetic acid menstruum, used in exactly the same way at the same time, gave the two columns of parallel differences occupying the first part of the table and completing the first pair, of 500 grammes each of the same powder of buckthorn.

For the second pair, cascara (R. purshiana), the U.S.P. requires the bark to be in No. 60 powder, as it is thicker, harder and more difficult to exhaust. The 500 grammes of this was moistened with 225 c.c. of the U.S.P. menstruum, "diluted alcohol" (41 per cent.), packed firmly, filled with the menstruum, macerated forty-eight hours and then percolated slowly. The percolate was received in

successive fractions of 100 c.c. each, each fraction weighed, and the weight of 100 c.c. of the menstruum subtracted to get the series of progressive differences.

Then a parallel process was managed exactly in the same way at the same time with a 10 per cent. acetic acid menstruum, giving the parallel column of differences of the second portion of the table.

	Grammes.
The weight of 100 c.c. of officinal U.S.P. menstruum for buckthorn, at average room temperature, is	95·08
100 c.c. of 10 per cent. acetic acid menstruum is	101·19
For cascara, 100 c.c. U.S.P. menstruum ("Diluted Alcohol") is	93·48
100 c.c. of 10 per cent. acetic acid is	101·19

The first four fractions of percolate from each of the four percolations were added together and reserved.

The remaining thirteen fractions were together evaporated on a water-bath to 60 or 70 c.c. of extract and this was dissolved in the reserved portion and the whole was made up to 500 c.c. by the addition of fresh menstruum to finished fluid extract.

The 500 c.c. of finished fluid extract from each menstruum weighed as follows, and gave the following proportion of nearly dry extract:

					Per Cent.
Buckthorn by U.S.P. menstruum,	513·0	grammes	extract		22·3
" " acetic acid "	542·1	"	"		22·5
Cascara " U.S.P. "	527·1	"	"		32·5
" " acetic acid "	565·5	"	"		42·7

The finished fluid extract of buckthorn by acetic acid contained 8·8 per cent. of free acid.

That of cascara, 9·7 per cent.

Fluid extracts made by repercolation gave of free acid—from buckthorn, 7·7 per cent.—from cascara, 7·8 per cent.

The percolation having been carried to practical exhaustion in both varieties, the fluid extracts must be accepted to represent the value of the drugs, and this value is contained in cascara in a much larger proportion of extract. But this is due not only to difference of menstruum, but also to difference of fineness of the powder percolated. The U.S.P. directs buckthorn in No. 40 powder, and cascara in No. 60, and for this reason the latter yields the larger proportion of extract, and makes any close comparison of degree and

rate of exhaustion impracticable. The powders should have been of the same degree of fineness. So far, however, as the table goes, it shows the U.S.P. menstruum to be the best for exhaustion.

But, in comparing the resulting fluid extracts, the acetic acid menstruum yields much the best preparations in every respect.

RATE AND DEGREE OF EXHAUSTION.

Fractions of Percolate.	Rhamnus Frangula, Buckthorn. Differences.		Rhamnus Purshiana, Cascara. Differences.	
	U.S.P. Menstruum.	Acetic Acid Menstruum.	U.S.P. Menstruum.	Acetic Acid Menstruum.
	Grammes.	Grammes.	Grammes.	Grammes.
1st 100 C.c.	9·55	8·38	12·28	11·27
2d " "	8·08	6·88	11·33	10·45
3d " "	5·71	5·34	10·56	9·21
4th " "	3·94	3·31	9·36	8·00
5th " "	2·74	2·68	6·13	6·12
6th " "	1·62	1·48	4·55	4·84
7th " "	1·16	1·05	2·18	3·08
8th " "	·93	1·01	·38	1·37
9th " "	·92	64	·21	·77
10th " "	·47	·62	·00	·47
11th " "	·40	·40	·13	·39
12th " "	·24	·48	·07	·22
13th " "	·23	·25	·02	·29
14th " "	·41	·46	·11	·25
15th " "	·19	·22	·00	·14
16th " "	·00	·26	·00	·19
17th " "	·13	·10	·00	·07
	36·72	33·56	57·31	57·11

The U.S.P. fluid extracts of both buckthorn and cascara are intransparent, almost black, of the consistence of thin syrup, and have a considerable deposit.

Those from acetic acid are also intransparent but less black, of thinner consistence, and with very little deposit.

Diluted in the proportion of 1 c.c. to 60 c.c. of water, the U.S.P. buckthorn gives an opaque mixture with a heavy deposit.

U.S.P. buckthorn gives an opaque mixture with a heavy deposit.
" cascara gives a muddy mixture with a heavier deposit.
Acid buckthorn gives a nearly clear dilution, very slight deposit.
" cascara gives a nearly clear dilution, heavier deposit.

These dilutions, which are about right for administration, are all bitter, but of quite different degrees and character of bitterness. The U.S.P. cascara is a moderately strong and not an agreeable bitter. The acid cascara is quite as strong a bitter, but more agreeable on account of the acidity which is barely perceptible.

The U.S.P. buckthorn is very slightly bitter—hardly disagreeably so; and the acid buckthorn has this very slight bitterness agreeably modified by the perceptible acidity.

On the whole, the sensible properties are decidedly in favor of the acetic acid menstruum.

But this does not serve to compare the therapeutic or medicinal value of the menstrua, and as there is no separable active principle for comparison by quantitative assay this becomes a difficult point, not to be reached with critical accuracy.

Still, as the barks have a very decided and uncomplicated therapeutic activity, it was thought that a useful comparison might be made by dosage administration.

The two fluid extracts of buckthorn and cascara each represented the bark from which it was made in the proportion of cubic centimetre for gramme (or minim for grain), and with these a comparison of physiological activity was attempted.

A person was found in fair ordinary digestive health with regular habits of diet and exercise, having a daily alvine discharge. This daily discharge was of fairly uniform character, small in volume but hard in consistence, of good dark color, well elaborated and discharged slowly with much effort, and by habit, without desire, at bedtime.

In short, this is a case of simple constipation kept under control by force of habit, and although it is but a single case, and as such is a law unto itself only, it served fairly well upon which to measure the activity of these fluid extracts. The time for the habitual daily discharge was bedtime. The time for taking the doses was after each of the three daily meals. The intervals after the general trials

in which to get back to the original habit were never less and generally much longer than a week.

By experiment it was found that a convenient dose by which to note the effects was 0·5 c.c. = 8 minims in about 30 c.c. = 1 f℥, of water, and the time to look for the effect was the bedtime of the second day, after one dose or two doses or three doses on the first day, etc.

First Testing.—The U.S.P. buckthorn. A morning dose of 0·5 c.c. produced no perceptible effect upon the discharge of the bedtime of the first or second day. Interval of three days.

2d trial. A morning and midday dose of 0·5 c.c. each gave no perceptible effect at bedtime of the first or second day. Interval of three days.

3d trial. A morning, midday and evening dose gave a very slight effect at bedtime of the second day. Interval of three days.

4th trial. A dose after each of the three meals of the first day, and after the morning meal of the second day—four doses in all—gave a moderate but distinct effect on the consistence of the discharge at bedtime of the second day, without any griping or other disturbing effect. Interval of eight days.

Second Testing.—The acid buckthorn. Taking it as assured that this preparation is at least not very much less active than that of the U.S.P., the first three trials were all made by doses after the meals of the first day, and the bedtime discharge of that day was slightly increased in volume, but in other respects unchanged by the three doses. The fourth dose after the morning meal of the second day, to have been parallel to the U.S.P. preparation, should have been waited for till bedtime and should then have given a moderate but distinct effect on the consistence of the discharge. But the condition became imperative, producing a free discharge within three hours after the fourth or morning dose of the second day, without any griping or other disturbance up to the period of urgency.

That is, four doses (2 c.c. in all) of the U.S.P. preparation of buckthorn gave a moderate effect in about thirty-five hours, while the same quantity of the acetic acid preparation under closely similar conditions gave a full effect in about twenty-seven hours. This experiment repeated in the reverse order, that is, the acid preparation first and U.S.P. second, after three days' interval gave similar results with the acid preparation in thirty hours, U.S.P. in thirty-

three hours, giving an advantage to the acetic acid menstruum which could hardly have been all accidental, and it is therefore concluded that the acid menstruum is at least equal in medicinal value to the alcoholic.

A useful comparison of the two fluid extracts of cascara was more difficult on account of the tendency of cascara to gripe unless some corrigent was used, and such use confused the experiments. By repeated preliminary trials it was found that cascara was much more active than buckthorn, the proportion being about 0·3 c.c. of cascara to give the quantitative results of 0·5 c.c. of buckthorn, but the results were so different in quality as to badly confuse the relations. The best that could be done with cascara was to find that a dose of 0·5 c.c. of the U.S.P. fluid extract given after the morning and midday meals gave an average of purgative—not laxative—effect and of griping, and that the same doses and similar management with the acetic fluid extract gave practically the same results, so that there is no discoverable difference either in the activity or the harshness of the fluid extracts as made with the different menstrua.

Whilst these experiments make no claim to great accuracy of results, they do fairly establish the conclusion that the acid menstruum is at least fully equal to the alcoholic, with all the possible differences in favor of the acid.

Incidentally these experiments offer an opportunity for a useful comparison of the medicinal effects of the two officinal varieties of Rhamnus.

The cascara has nearly double the activity of buckthorn, the equivalent doses being 0·3 c.c. of cascara to 0·5 c.c. of buckthorn, but in this proportion, and in other proportions tried, cascara gripes while buckthorn does not. The effect of a good corrigent to prevent the griping is needed in the use of cascara. Cascara is an evacuant and is liable to leave a lingering action on the lower bowel. Buckthorn is a mild laxative, acting insensibly and leaving no irritability or after-action. It needs no corrigent, and is not a disagreeable bitter, as is cascara. Buckthorn is not a good purgative, or even a good evacuant, but is an excellent mild laxative, and in effect is not unlike the general effect of blue mass.

Cascara is not a therapeutic duplicate of senna, yet is much like

it in the character and quality of its effects, with the advantage of smaller dose.

Buckthorn bears a somewhat similar relation to rhubarb, but is more simple and mild in operation, is more limited in application, and required in much smaller doses for its best effects. All are laxatives and produce feculent discharges, whilst salines and mineral waters are aperients and tend to produce watery discharges.

The two officinal varieties of Rhamnus are simple laxatives, and if kept within their scope and skilfully applied they seem well adapted to the very extensive use into which they have grown. The smallness of the dose in which they are effective is accounted for in the circumstance that they give bilious discharges, and discharges with the color and character of bile indicate stimulation of the liver, while stimulation of the liver indicates increased secretion of bile, which of itself would give a laxative effect without buckthorn, just in the way that mild mercurials are supposed to act; that is, a stimulant to the liver is the excitant to increased secretion of bile, and bile is the natural laxative of the digestive process.

A very good way, if not the best way, to use the fluid extract of buckthorn to correct a constipation is to give 0·5 c.c. diluted with about 30 c.c. of water after each meal for one day, and for one or two meals of the second day, or until a mild laxative effect is obtained. Then to reduce the number of doses to one or two a day for one or two days—then to one a day—then on alternate days—then once or twice a week until a natural habit is established, and no longer. But as each case needs a little special management, it is only practicable to give a general plan of application, to be modified by the effects in individual cases, with great caution not to get an evacuant effect when only a laxative effect is desired. In many individuals a dose of 0·5 c.c. after the morning meal for three or four days will give the appropriate laxative effect when 2 c.c. given at one dose would be evacuant and would leave a condition of costiveness as bad as the original condition for which the buckthorn was taken.

A FALSE CINNAMON has been examined by Micko. It is the bark of an unknown species of Cinnamomum, but does not contain the aromatic cinnamon oil. It is also exceedingly mucilaginous.—*Zeitschr. d. Nahr. u. Genuss.*, 1900, p. 306.

A CHEMICAL STUDY OF ASTRAGULUS CARYOCARPUS.

(PRELIMINARY.)

BY G. B. FRANKFORTER.

It has been stated that the fruit of the *Astragulus caryocarpus*, in certain stages of its growth, contains a poisonous substance which resembles in some respects that which is supposed to exist in *Astragulus mollissimus* or common loco plant, *Astragulus drummondi*, *Astragulus oxytropus*, *Astragulus pattersoni* and several others of the same family. Up to the present time, the *A. caryocarpus* has not been carefully studied, and reports are as unreliable as in the case of many other members of the family. O'Brien (Bulletin 25, Agricultural Experiment Station of Colorado) refers to it, without, however, making any special examination of it. Chestnut, in his "Catalogue of Plants Poisonous to Stock" (Annual Report of the Bureau of Animal Industry, of 1898), mentions several species of Astragulus, including *A. hornii* and *A. bigelovii*, and concludes that other species are likewise poisonous. In fact, from both written and unwritten reports, it is quite probable that all of the species of Astragulus in the Western and Northwestern States have been regarded as poisonous. As *Astragulus caryocarpus* was formerly very abundant in Eastern Nebraska, the writer had excellent opportunities for studying its physical characteristics, and later, for studying it from the chemical point of view.

The Astragulus belongs to the Pulse family and is well represented throughout the Western and Northwestern States. The *A. caryocarpus* grows abundantly on the wild prairie lands of Kansas, Nebraska and parts of Dakota, but is rapidly becoming extinct as the prairies become cultivated. While under ordinary conditions it refuses to become civilized, it does, however, grow on cultivated soil. Botanically the plant is known as the "ground plum," but it is better known in the Western States as "hog-apple," a name given to it, it is said, because swine devour the ripe fruit voraciously.

Regarding the poisonous properties of *A. caryocarpus*, I can state that I have often eaten the fruit in its various stages of growth and have never experienced the slightest poisonous effect; nor have I known of but a single case where poisoning seems to have come from the plant. There is in the unripe fruit a bitter taste which lingers after the characteristic sweet taste has disappeared. That

this bitter taste is due to an alkaloid there can be little doubt. It seemed to be located in the woody part of the fruit and was later found in the plant itself. The work of O'Brien on the "loco weed," already referred to, likewise indicates that *A. mollissimus* is not poisonous, notwithstanding the many reports to the contrary and the fact that distinct alkaloidal reactions were obtained by him.

ASTRAGULOSE.

Among the peculiar properties of the ripe fruit of the *A. caryocarpus* is its peculiar sweet taste, due to the presence of a carbohydrate. It is probable that this sugar will account for the vulgar name above mentioned. It would likewise account for the somewhat mythical statement of its use by the aborigines of the plains. I have positive knowledge of its use by the early settlers of the plains, especially in the making of pickles.

An examination was begun by a preliminary test of the juice of the ripe fruit. It gave all of the common tests for the sugars, being optically active, reducing Fehling's solution and forming a beautiful hydrazone. Material was therefore gathered preparatory to a careful examination.

The fruit upon which the following experiments were made was collected about the middle of June, when it had reached maturity. In this ripe state it resembles the common small green plum, with frequently a peach color when not too much protected from the sun. In the preliminary examination, 1 kilo of the ripe fruit was macerated and the juice removed by pressing through a linen cloth. About 350 c.c. of the impure juice were thus obtained. The fibrous matter was extracted with water, filtered and the filtrate added to the original juice. At this stage the juice had a yellowish-green color and a peculiar sweet taste. It was purified by passing through a filter press, then treating first with sodium sulphite and afterward with basic lead acetate and filtering. Excess of lead was removed by sulphuric acid and the clear filtrate evaporated on a water-bath. The residue was a dark brown syrup showing indications of decomposition. It was redissolved in water, again purified and evaporated on a water-bath. The same brown residue was obtained. An examination showed the presence of a considerable quantity of free sulphuric acid. It was supposed, therefore, that the change of color was due to the presence of free acid. The residue

was again dissolved in water and the free acid removed by treating with barium hydroxide. The barium sulphate was filtered off and the excess of hydrate removed by carbon dioxide. The same brown residue was obtained on evaporation. It was evident, therefore, that the substance decomposed by simple evaporation on a water-bath. This residue was subsequently examined for the alkaloids, the results of which will be tabulated later on.

From the repeated processes of purification given above, the amount of sugar seemed to be reduced to such a proportion as to make it undesirable to proceed further. Accordingly, the method was tried again, with larger quantities, modifying so as to remove completely any free acid. About 15 kilos of the fruit were treated as indicated above, except that, instead of basic lead acetate, aluminum hydroxide was used. The free acid was removed by barium hydroxide. The solution still had a slight color, and was further purified by filtering through animal charcoal. This practically clarified the solution. A small quantity was evaporated on a water-bath. It again turned brown. The remainder of the solution was set aside and allowed to evaporate spontaneously. After several days the solution became concentrated enough to appear syrupy. It had changed slightly in color, becoming a light yellowish-brown. It refused to crystallize from all of the common solvents. From alcohol, it appeared as an amorphous powder; from the other solvents, as a syrup. This syrup was later obtained as a solid substance by evaporating in a vacuum desiccator over sulphuric acid. After several days' drying in vacuum, the substance became a solid mass, which, upon rubbing, became a light gray powder. This powder was hygroscopic, and still possessed the same sweet taste. It reduced Fehling's solution and turned the plane of polarization. The specific rotation was taken after the substance had been repurified twice from alcohol and animal charcoal and dried over sulphuric acid. The substance, thus purified and dried, had a specific rotation $(a)D = + 38{\cdot}5$. The melting point was 95°–98° C. Analyses were made, the results of which corresponded best for the ordinary disaccharide.

THE PHENYLHYDRAZONE.

By boiling a concentrated solution of the substance with phenylhydrazine, a well-defined hydrazone was precipitated from the solu-

tion. The substance was amorphous. It dissolved in alcohol with difficulty, and precipitated out on evaporating off the alcohol as a fine crystalline powder. When first precipitated it was light brown, but on standing for some time it changed to a dark brown. The purified substance had a melting point of 186°–188° C. An analysis indicated a hydrazone of a hexose.

No conclusion can be drawn from the above facts as to the size of the molecule. Many of the more complex sugars break down by treating with phenylhydrazine into simple hexoses and then form hydrazones. It is possible that such a reaction takes place here, as it is necessary to boil for some little time before the hydrazone is formed. Another indication that the substance breaks down is the fact that the optical activity changes by boiling or on standing. As an instance of the change in the specific rotation, a half pound of the once purified syrupy mass was placed in a desiccator over sulphuric acid and allowed to remain for several months. When the substance was finally removed for continuing the work, it was found to have lost its optical properties; it had become practically inactive. At the same time it had increased its reducing power. It was rather expected in the beginning that this sugar, notwithstanding the fact of its peculiar properties, might be a common form, either dextrose or lævulose. The data obtained, however, practically excluded such a possibility. The fact that it becomes inactive on standing makes the problem complex. In becoming inactive, the sugar undoubtedly breaks down, resulting in either a simpler inactive sugar, together with certain inactive by-products, or in two sugars with equal dextro and lævo properties. The latter is only a bare possibility, the former is probable.

From recent stereochemical developments of the sugar group by E. Fischer, a great number of isomeric forms is possible. Many of these forms have already been made synthetically, while a few have been found in nature. Most of those forms thus far found in nature belong to the so-called mono- and di-saccharides, although it is quite probable that as our knowledge of the group grows, simpler forms like erythrose and pentose, together with more complex forms like heptose, octose and nonose, will be found. That many polymeric forms of the monosaccharides exist is evident from the occurrence of raffinose and gentianose and from the peculiar nature of the starch and cellulose groups.

While analysis of the substance in hand indicated a probable disaccharide, further work will have to be done before the size of the molecule can be finally determined. Derivatives are now under examination which, it is hoped, will throw new light on the substance.

AN EXAMINATION OF THE PLANT.

In the preliminary examination of the fruit, the apparently decomposed residue mentioned was incidentally extracted with chloroform. On evaporating off the chloroform, a small quantity of a light-colored substance remained. On first examination this substance appeared amorphous, but on carefully examining under the microscope it was found to be crystalline. These fine needle-shaped crystals were especially distinct if the residue was first treated with a small quantity of ether. An examination of these crystals, so far as possible, was made. They were found to be organic and to contain nitrogen. They had a bitter taste, were soluble in chloroform, slightly so in ether and almost insoluble in alcohol. They gave distinct alkaloidal tests, although the quantity was insufficient to make an extended examination.

In the examination of the plant itself, the roots as well as the stems and leaves were taken. Several methods of extraction were tried, including those given by Dragendorff and Otto, but the best results were obtained by extracting the material with dilute alcohol slightly acidified with sulphuric acid. About 4 kilos of the material were thoroughly triturated and enough alcohol poured over the material to completely cover it. After standing several hours, it was transferred to a 5-litre flask and the alcohol distilled off rapidly by steam. On evaporating the distillate to dryness, an apparently amorphous residue remained. An examination of this residue under the microscope revealed fine acicular crystals very similar to those found in the fruit. As in the case of the fruit, the quantity was so small that no successful means of separating these crystals from the amorphous substance could be found. These crystals were examined and found to give many of the characteristic alkaloidal reactions. They contained nitrogen and formed a well-crystallized platinum double salt. Analysis was rendered impossible on account of the small quantity of material and on account of the difficulty in separating the crystals from the amorphous substance.

An examination of the aqueous distillate, collected after the alcohol had been removed, revealed the presence of a substance which gave a very peculiar odor when treated with ammonia. The amount was very small. Distillation was now stopped and the water extract examined. It was first purified as far as possible by passing through a filter press, then treated with barium hydroxide to remove the excess of sulphuric acid. The barium sulphate carried down much of the coloring matter with it, so that the solution, after filtering, was almost clear. The whole of the solution was evaporated to dryness on a water-bath. The residue resembled very closely that obtained from the fruit. A portion of the residue was extracted with chloroform. On evaporating the chloroform, a light-colored powder remained. This substance had alkaloidal properties and resembled very closely the substance obtained from the fruit, although no crystals could be obtained on account of the large proportion of amorphous matter. In attempting to separate the amorphous substance from the crystals, the quantity of ether sufficient to remove the amorphous matter likewise dissolved the crystals. Traces of crystals were obtained by treating with alcohol, which only partially dissolves the amorphous matter. Distinct alkaloidal reactions were obtained, as in the case of the substance obtained from the fruit, even to the formation of a platinum double salt. Lack of material made it necessary to curtail experiments at the present time, but it is believed that, with abundance of the plant, an alkaloid can readily be obtained.

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NOTES ON GOLD-SODIUM CHLORIDE.

By Lyman F. Kebler.

If any one will take the trouble to obtain quotations from the various manufacturers or consult their price lists, it will become apparent at once that there must be either a considerable margin of profit for some, or that the gold-sodium chloride varies much in composition. The difference in prices or information on the labels is such, however, that the various makes come into direct competition with one another. For example, 1 ounce of gold-sodium chloride, U.S.P., in ⅛-ounce vials, is quoted by several makers

(wholesale price list) at \$5.90, \$6.10, \$7.50, \$9.60 and \$14.50, respectively. Again, some makes, without any specifications as to quality, are generally quoted a few cents below those containing information as to quality.

It must be remembered that the 1890 Pharmacopœia requires this article to contain 30 per cent. of metallic gold, and a commercial article may contain less for photographic purposes, but the latter should be so labelled as not to be brought into direct competition with the more costly article. If a certain article is prepared for photographic purposes or for some other purpose, let it be so labelled as not to be misleading.

In order to get positive information about this article, the writer secured a number of samples, and a careful examination of the same gave the following results:

ANALYTICAL DATA OF GOLD-SODIUM CHLORIDE.

Number.	Condition.	Reaction to Ammonia on Glass Rod.	Reaction to Litmus.	Weight in Grains in 15-Grain Vial.	Solution Containing 15 Grains in 100 c.c. Distilled Water.	Marks on Labels.	Actual Per Cent of Metallic Gold Gravimetric.	Per Cent. of Gold Based on 15 Grains Gravimetric.
1 . . .	Quite moist	None	Acid	13·55	Slightly opalescent	15 grains	23·55	21·29
2	Dry	"	"	14·42	Clear	"	27·22	26·13
3	"	"	"	14·26	Slightly opalescent	"	25·00	24·68
4	"	"	"	17·53	Clear	" U.S.P.	28·31	32·91
5 . . .	Slightly moist	"	"	14·45	Clear	15 grains U.S.P.	30·30	29·02

The amount of material contained in each vial was estimated by removing the stopple, determining the gross weight, then carefully removing the chemical by means of water, drying the vial and obtaining its weight. From these weights the amounts of gold-sodium chloride in each vial can readily be calculated, and if there should be an error in any direction, it is quite likely to be in favor of the chemical.

The metallic gold was estimated as follows: Transfer the contents of a vial into a 250 c.c. evaporating dish, by means of 100 c.c. of a

1 per cent. solution of pure sulphuric acid. In this mixture dissolve 2 grammes of pure oxalic acid, then place the whole on a steam bath for two hours or until all of the gold is reduced to the metallic state. Decant the clear liquid as closely as possible, wash the gold with distilled water, dry, ignite and weigh. This method works well, but the volumetric process for this purpose appeared to be valueless.

From a careful perusal of the data contained in the table above, it can readily be seen that all the samples were of good quality, but there is a wide variation in the percentage content of gold.

In order to fully comprehend the actual difference in money, existing between the various samples, it is only necessary to compare the figures below:

Number.	100 Ounces Gold-Sodium Chloride Contained Pure Gold.	Cost at $21 per Ounce.
	Ounces.	
1	21·29	$447 09
2	26·13	548 73
3	24·68	518 26
4	32·91	691 11
5	29·02	609 42

The greatest difference, based on the cost of the gold only, amounts to $244.02, or, by eliminating the highest, which appears to be somewhat abnormal, the difference becomes $162.33. In other words, the purchaser of 100 ounces of the article containing the smallest per cent. of gold is paying $162.33 for something he is not getting. In this case, as in so many others, the cheapest is the most expensive.

THE CULTIVATION AND ECONOMICS OF AGAVES.

By Frederick L. Lewton.

The agaves are a most characteristic group of plants of the hot and arid regions of the North American continent. They include the largest and tallest of our herbaceous plants, and on account of their size, symmetry and elegant proportions were well named by Linnæus from the Greek "Αγαυή," signifying noble, admirable or wonderful.

Nearly all the agaves are natives of Mexico, Central America and the Southwestern United States, a few others being found in South America and the West Indies. *Agave Americana,* the best known species, is cultivated along the Mediterranean in India and Africa.

The thick fleshy leaves of agaves, arranged around a very short axis in the form of a tuft, are in most species armed with stout terminal spines and prickly or horny margins. The young leaves wrap very tightly around each other, forming a long cone-shaped central bud. The outer surface is adapted to resist the evaporation of moisture, and the roots as well as the leaves contain a large amount of mucilage and saponin, which retain water with great tenacity, and enable the plants to live in the most arid regions.

These plants grow slowly, and under cultivation are so rarely known to bloom as to have long been called "Century Plants." Under their natural conditions they reach maturity in from three to fifteen years, according to the species. When this period is reached the new leaves become smaller and narrower and the central bud thickens. The flower-stalk appears and rapidly shoots upward, sometimes reaching a height of forty feet. In some species this flower-stalk looks like an immense candelabra bearing many flowers of a greenish-yellow color. Such a great expenditure of vitality usually exhausts the plant, and after sending out suckers or offsets it dies, to be succeeded by the next generation. Some species, however, bear annual leaves and may bloom annually, but these are not of great economic importance.

There are over 150 described species of agaves, about one-half of which are indigenous to Mexico, but when these plants become better known there is no doubt but that the number of species will become greatly reduced.

Much remains to be done in the way of studying these plants, as in but few cases can their well-known and important economic products be referred to a certain species.

ECONOMIC PRODUCTS.

The uses to which agaves have been put are almost as extensive as those of the famous cocoanut palm.

Of the more important economic products may be mentioned ropes, twine, thread, sacks, hammocks, saddle-cloths, hats, baskets,

brushes, paper, etc., from the leaf fibres; food, drink and medicine from the sap; soap substitutes from the leaves and roots, handles for lances, fishing poles, razor strops, scouring mats, and walls for houses from the flower-stalks; needles and thread, thatching for roofs, and fodder for cattle from the leaves. The plant itself is much used for hedges.

FIBRES.

The Mexican agaves, from which fibre is extracted, have various common and local names. In commerce and in books of travel these names have become greatly mixed. Dr. Rose says that "maguey" is a generic term applied to most of the agaves proper, *i. e.*, those having evergreen leaves. "Lechuguilla," which means "cabbage-like," is applied to many of the smaller agaves as well as to other plants.

Tampico fibre or Tampico hemp is the term applied to all fibre shipped from the port of Tampico on the Gulf Coast, and under this term is included the fibre of several species of agave as well as that from one or more species of yucca. "Ixtle" is the fibre of the short-leaved agaves, and "guapilla" that of the linear-leaved species. "Tapemete" and "Huila" are local names for the fibre from certain agaves, the latter being a very coarse, harsh fibre, mostly used for making heavy ropes. "Henequen" or "Sacci" is a fine white agave fibre produced in Yucatan, while "Sisal hemp," "Sisal grass" or "Yaxci" is produced in Southern Mexico, chiefly in Campeche.

PREPARATION OF FIBRE.

The preparation of Tampico hemp is best described by an eye-witness, Mr. E. W. Nelson, as follows:

"The leaves are from 15 to 30 inches long. Only the tender, unfolded leaves forming the central bunch are used, as the fibre of the old outer leaves is too coarse and brittle. This central spike of unopened leaves, called "Cogollo," is gathered by means of a short staff, 4 feet long, with an iron ring fitted by a ferrule to one end.

"The iron ring is slipped over the cogollo and a quick wrench breaks it loose, and it is then placed into a basket on the laborer's back. The man gathers a backload in this way and proceeds to a large bush or small tree, where he can get shelter from the sun,

and, placing the leaves in a heap near the base of the tree, proceeds to clean out the fibre.

"A short block of yucca wood is laid on the ground close to the tree and the pointed end of a long triangular blade of iron, with a wooden handle, is thrust into the base of the tree trunk and held across the block of yucca wood. The workman then strips the edges from the agave leaves to rid them of bordering spines and, holding the butt in the right hand, lays the leaf on the wooden block and, pressing down the iron, draws the leaf through, thus scraping out most of the pulpy matter.

"Then a small wooden grasper, with a knob at one end, has the free ends of the fibre wrapped about it in a 'half-hitch,' and, by grasping this, the workman can draw the leaf under the iron in a reverse direction, thus cleaning the leaf in two motions. The fibre is laid at full length on the ground and the process repeated until the supply of leaves is exhausted. Men clean from 10 to 15 pounds of fibre a day, for which they receive from 2 to 2½ cents a pound."

With some agaves the leaves are put into boiling water to wilt them, and so render the cleaning of the fibre more easy, or they are cooked and allowed to stand in water several days, when the pulpy matter is removed by rubbing them with a stick. This is sometimes done by drawing the leaves over iron spikes 8 or 9 inches long, driven into a block of wood.

The machines used in some parts of Mexico, and especially in Yucatan, for the cleaning of the fibre are simply crude scraping wheels run by steam or animal power.

BEVERAGES.

The beverages obtained from the agaves are of two kinds, fermented and distilled. The fermented drink is called "pulque," and is universally used in Mexico, especially about the City of Mexico, which city consumes over 50,000 pints of pulque a day, and there are eight or nine hundred "pulquerias," or "cantinas," corresponding to our saloons, which sell nothing else.

The pulque agaves are several in number, and all have broad thick leaves. They are cultivated throughout the mountain regions and on the table-lands, particularly on the plains of Apam, a tract nearly 1,000 square miles in area, lying in the States of Mexico, Puebla and Hidalgo, about 60 miles from the City of Mexico.

When the pulque agave has reached maturity and is about to bloom, a great upward flow of sap takes place. This sap, called "aguamiel," or honey-water, is very sweet, and is much liked by the Mexicans and Indians. At this time the central bud is cut out, leaving a cavity large enough to hold a gallon or two of liquid. The sap exudes into this cavity, and is removed twice a day, being drawn out by suction into a long narrow gourd and emptied into a pigskin or clay pot. The surface of the bowl or cavity is scraped each day to increase the flow of sap, and the outer leaves are bent over and fastened together to prevent too rapid evaporation. Some plants produce an average of two gallons a day for several months.

The sap or "aguamiel" at this stage is clear green, yellowish or whitish and mucilaginous, according to the species, and rapidly ferments, becoming milky by the formation of carbonic acid. It then tastes like cider. To prevent too rapid fermentation, for in a few hours it would become vinegar, the sweet pulque is poured into a "tinacal," a square vat made of raw oxhide, and to it are added an equal amount of milk and a slight amount of liquid rennet. The pulque soon acquires a strong yeasty or cheesy odor and tastes like stale buttermilk.

The Mexicans consider pulque stomachic, an aid to digestion and sleep, and an excellent remedy in many diseases. If one can get accustomed to the odor of sour milk and slightly tainted meat, the liquor is said to be cooling, palatable and nutritious. It contains about 7 per cent. of alcohol, and when imbibed in large quantities is quite intoxicating.

The distilled drink, called "aguardiente de maguey," "mezcal," or "tequila," is a fiery liquor resembling strong rum, and is made from certain other species of agaves, called mezcal magueys, having thinner and narrower leaves. The natives of the mountain regions make their mezcal from several wild species, but the tequila maguey is cultivated in large plantations, particularly in the State of Jaliseo.

The Indians of Arizona make mezcal from *Agave palmeri.*

FOOD.

Certain agaves of our Southwestern States and Territories are much prized by the Indians as food.

These have short broad leaves and are called "Mezcal," the species most highly prized being *A. palmeri*, *A. applanata parryi* and

A. Utahensis. They are prepared for food as follows: A pit is dug and lined with small smooth stones. A fire is lighted in the pit and kept burning until the stones are thoroughly heated. It is then raked out and the tender parts of the plants are piled on the hot stones and covered with grass and earth. They are then left to steam for two or three days. By this time all except the fibrous tissue is reduced to a jelly-like mass, which is sweet and nutritious.

SOAP SUBSTITUTES.

The Mexicans make use of many roots, barks and fruits called "amole," in place of soap, or for its manufacture. Dr. Rose says that the herbaceous annual-leaved agaves are called "amole" all over Mexico, and that *A. brachystachys* is the one most used. The part of the plant used is the thick, irregular root-stock. These root-stocks, when dried and grated, are put into water, forming a good lather.

Dr. Havard states that in *Agave lechuguilla* the connective tissue "constitutes about 40 per cent. of the green leaf; when dried it is a white or yellowish mucilaginous powder, which possesses remarkable cleansing properties, principally due to the presence of saponin. It imparts a smooth and satiny appearance to the skin, and is used successfully in removing stains from the most delicate fabrics."

MEDICINAL USES.

The Mexican Pharmacopœia says that "amole de raiz," or root of *Agave Mexicana*, serves for washing clothing, and the juice taken internally is diuretic, laxative and an emenagogue; while externally it is used for the itch.

The aguamiel or honey-water is also officinal, and is recommended as an anti-scorbutic.

Pulque is believed to be an efficient remedy for Bright's disease.

Other products of the agave are sugar, vinegar and a thick, sweet substance resembling honey, made by evaporating the fresh sap.

CULTIVATION.

The principal regions in Mexico for the cultivation of the pulque magueys are the arid limestone hills and table-lands.

The plants do not arrive at maturity until eight years old, the expense of cultivation to this time being usually calculated at about $2, while the return is from $7 to $10, according to the size of the plant. The young plants used in planting a pulque field are the suckers, which are thrown out from the mature plant on all sides and which must be removed before the flower-bud is cut out. They are placed in rows about 9 feet apart, and require very little attention until the period of flowering commences. This period is very uncertain, but in a plantation of 1,000 agaves an average of 100 plants are ready to bloom every year.

Experience is necessary to know when to cut out the flower-bud, and if this operation be performed either too early or too late, it is unsuccessful and destroys the plant. The flow of sap continues for about five months, and in that time each plant is supposed to yield from 125 to 160 gallons of liquid.

The chief drawback to the cultivation of the pulque maguey is the long period that must elapse before a new plantation can be rendered productive and the uncertainty of the time of flowering. However, the plantations, when once established, are of great value and are a continual source of income.

Except in the State of Yucatan, the fibre magueys are seldom cultivated, the natives obtaining their supply of fibre from the wild species.

In Yucatan, near Mérida, there are several plantations of large size where Henequen fibre is produced from agaves scientifically cultivated.

More than three-fourths of the agave fibre exported from Mexico comes to the United States, and only a small amount of such fibre is imported by the United States from outside of Mexico.

The following tables show the amounts exported and imported:

TOTAL AMOUNT OF AGAVE FIBRES EXPORTED FROM MEXICO.

	1897.		1898.	
	Kilos.	Value in Pesos.	Kilos.	Value in Pesos.
Ixtle or Tampico	9,165,477	812,974	6,959,511	616,650
Henequen, Sisal	71,091,697	7,433,806	75,244,863	11,588,572

TOTAL AMOUNT OF AGAVE FIBRES IMPORTED BY THE UNITED STATES.

	Year Ending June 30, 1898.		Year Ending June 30, 1899.	
	Tons.	Value.	Tons.	Value.
Ixtle or Tampico	2,563	$130,294	4,419	$274,811
Henequen, Sisal	69,322	5,171,623	71,898	9,211,337

AGAVE FIBRES IMPORTED BY THE UNITED STATES FROM MEXICO.

	1897.		1898.	
	Tons.	Value.	Tons.	Value.
Ixtle or Tampico	6,312	$335,749	2,559	$130,055
Henequen, Sisal	62,839	3,809,415	68,432	5,104,228

PHILADELPHIA MUSEUMS.

SOME OF THE UNPUBLISHED RESULTS OF THE INVESTIGATION OF THE TANNINS BY THE LATE PROFESSOR HENRY TRIMBLE.

COMPILED FOR PUBLICATION BY JOSIAH C. PEACOCK.

In presenting the matter which is to be published under this heading, some explanatory remarks will be appropriate. When Professor Trimble died, in August of 1898, he had in his possession the results of a great many estimations of tannin which had not been published. It was the intention of Professor Trimble to bring out some of these results in a connected and logical manner in future volumes of his work "The Tannins," and for this reason many of the results which could have been published several years ago were withheld. These results represent a considerable expenditure of time, care and work in procuring material and making the determinations, and it is believed they will prove of interest to those studying the subject of tannin or tannin-bearing plants. For these reasons it has been decided to publish such of these results as could be clearly stated. The results are grouped according to the order of plants from which the material was obtained, and the groupings are arranged alphabetically as to natural order.

In compiling these results for publication, the writer has not added to the results, nor attempted to draw conclusions from them; he simply presents the results and remarks on the materials as gathered from Professor Trimble's note-books. Under the circumstances of the case, this is thought to be best.

The writer was assistant to Professor Trimble for nine years, and he would like to assure every one, who aided Professor Trimble in any way connected with the materials upon which these results were obtained, of the sincere appreciation in which this aid was held by him. When known, the names of those persons who supplied Professor Trimble with material are mentioned in connection with the estimation of the material furnished.

The following persons assisted Professor Trimble in the chemical work: Calvin O. Kinzey, Griffith H. Maghee, Josiah C. Peacock, William E. Ridenour and Florence Yaple, and, since he had expressed his thanks to each of them in published papers upon other subjects, it is believed he would have recognized their services in connection with the topics now under consideration.

The hide powder method of estimation was used throughout the work.

Anacardiaceæ.—This section deals with the more commonly used species of sumach and a material known as ron ron.

Rhus Typhina.—The materials for this work were collected at Belmont, near Philadelphia, in 1894. The estimations were made immediately after the collections.

Part.	Date of Collection.	Moisture.	Ash in Absolutely Dry Bark.	Tannin in Absolutely Dry Bark.	Remarks.
Root bark .	June 23	67·07	8·86	7·74	
" . .	July 9	53·42	8·99	11·27	
" . .	Aug. 16	39·74	6·07	8·56	Leaves turning in color.
" . .	Sept. 16	11·53	6·97	7·41	Color of leaves not completely turned.
" . .	Oct. 16	49·56	9·69	1·86	Leaves completely turned in color.
" . .	" 28	21·92	10·11	1·46	
Whole bark of stem	June 7	32·84	3·30	4·39	
Inner bark of stem .	July 9	31·95	5·55	10·72	
Inner bark of stem	Aug. 16	42·75	5 57	11·78	Leaves are turning in color.
Inner bark of stem .	Sept. 16	9·97	—	5·22	Leaves are not completely turned in color.
Inner bark of stem .	Oct. 16	31·53	6·47	3 82	Leaves are completely turned in color.
Wood	June 7	12·11	0·64	1·30	
Leaves . . .	" 7	58·22	4·54	22·49	
" . . .	July 9	56·36	7·58	28·64	Bushes not blooming this year.
" . . .	" 9	53·81	7 05	24·35	Bushes blooming this year.
" . . .	Aug. 16	32·97	9·45	22·15	Turning color.
" . . .	Sept. 16	8·47	7·89	17·41	Not completely turned in color.
" . . .	Oct. 16	10·12	8·41	22·91	Completely turned in color.
Stem of Leaves .	June 7	53·17	4·48	2·34	
Fruit	July 13	26·68	3·32	12·13	Quite hairy.
"	Aug. 16	11·17	3·42	14·41	Fully developed.
"	Sept. 16	8·92	3·79	9·88	Leaves not completely turned in color.

The tannin was isolated from some of the leaves and stem bark. It showed the following composition:

	Leaves.	Stem Bark.	Gallotannic Acid.
Carbon	52·08	51·86	52·17
Hydrogen	3·89	3·87	3·10
Oxygen	44·03	44·27	44·73

Rhus Glabra.—The materials for the following estimations were collected in 1894, at which time the estimations were made.

Part.	Date of Collection.	Moisture.	Ash in Absolutely Dry Bark.	Tannin in Absolutely Dry Bark.	Remarks.
Bark of root .	June 23	63·85	5·58	3·59	Collected at Belmont, Pa.
" .	July 9	57·44	6·82	7·98	"
" .	Aug. 16	49·30	6·80	7·71	"
" .	Sept. 16	8·88	6·66	5·15	"
" .	Oct. 16	41·91	6·28	3·56	"
" .	Jan. 12, '95	9·76	7·00	3·15	Collected at St. David's, Pa.
Bark of stem,	July 9	49·23	5·49	11·03	Collected at Belmont, Pa.
"	Aug. 16	37·70	5·70	10·99	
"	Sept. 16	8·28	4·07	4·47	
"	Oct. 16	16·66	5·72	3·59	
Leaves . . .	June 2	41·29	3·62	13·83	Collected at St. David's, Pa.
" . . .	" 17	55·72	4·20	26·72	St David's. Collected in evening.
" . . .	" 18	61·75	4·40	27·06	Collected in morning from same bush as second sample.
" . . .	" 18	52·30	3·79	28·61	Collected from different bushes at St. David's.
" . . .	" 23	8·78	5·80	20·39	Received from Virginia.
" . . .	July 13	25·18	5·44	28·00	St. David's. Not blooming this year.
" . . .	" 13	42·11	5·13	26·60	St. David's. Blooming this year.
" . . .	"	39·29	4·62	40·52	Fresh leaves from North Carolina.
" . . .	" *	13·58	4·60	40·15	Cured leaves from North Carolina.
" . . .	Aug. 16	26·24	6·02	24·94	Belmont, Pa. Leaves are changing color.
" . . .	Sept. 16	7·72	6·03	24·27	Belmont, Pa. Leaves have all changed color.
" . .	Oct. 16	37·70	7·08	28·89	Belmont, Pa. Leaves have all turned deep red.
Flower . . .	July 23	38·08	6·52	30·36	Collected at St. David's.
Berries . . .	" 13	35·46	3·88	15·57	Formed, but not hairy. Belmont.
" . . .	Aug. 16	11·45	2·62	13·89	Collected at Belmont.
" . . .	Sept 16	9·59	3·03	9·78	"

* Date of estimation.

Galls of Rhus Glabra.—A number of these galls were found on August 25, 1892, in the vicinity of Wayne, Pa. A sample sent to the Department of Agriculture, Division of Entomology, at Washington, was pronounced by Acting Entomologist L. O. Howard as

produced by Pemphigus rhois, Fitch. It "is one of the plant-louse galls."

The tannin was isolated from some of these galls. It gave the qualitative reactions of gallotannic acid, and upon ultimate analysis showed the same centesimal composition as that substance.

Rhus Copallina.—Unless otherwise specified the materials of this member were collected at Belmont, near Philadelphia, in 1894. The estimations made on the freshly gathered materials showed the following figures:

Part.	Date of Collection.	Moisture.	Ash in Absolutely Dry Bark.	Tannin in Absolutely Dry Bark.	Remarks.
Bark of root .	July 9	50·53	4·00	13·94	
" .	Aug. 16	50·03	4·66	14·84	Bush did not fruit this year.
" .	Sept. 16	35·06	6·12	8·62	Leaves mostly changed in color.
" .	Oct. 16	49·03	5·94	8·24	Leaves deep red in color.
Inner bark of stem .	July 13	30·32	7·36	10·69	Collected just before the bush bloomed.
Inner bark of stem .	Aug. 16	37·57	5·17	11·61	Leaves beginning to turn. Did not fruit this year.
Inner bark of stem .	Sept. 16	11·09	5·97	6·04	Leaves mostly turned.
Leaves . . .	June 4	42·72	3·52	23·37	Collected at St. David's, Pa.
" . . .	" 23	8·74	4·16	26·18	Collected in Virginia.
" . . .	July 9	52·43	3·59	29·32	Collected at Belmont, Pa.
" . . .	"	41·00	3·62	33·90	Fresh leaves gathered in North Carolina.
" . . .	"	9·36	3·18	33·28	Same lot of leaves after "curing."
" . . .	" 24	56·44	3·37	42·51	Belmont, Pa. Bushes in bloom.
" . . .	Aug. 10	12·39	5·37	17·74	Collected at Asbury Park, N. J.
" . . .	" 16	23·98	4·40	33·28	Belmont, Pa. Beginning to change color.
" . . .	Sept. 10	7·64	5·27	20·24	Collected at Asbury Park, N. J.
" . . .	" 16	9·12	5·66	29·49	Belmont, Pa. Mostly changed in color.
" . . .	Oct. 16	10·04	5·74	32·39	Belmont, Pa. All deep red in color.
Flower . .	July 13	43·71	3·64	48·85	Collected just before opening.

Rhus Semialata and Rhus Canadensis.—The examination of some material from these species showed the following quantities:

Species.	Part.	Moisture.	Ash in Absolutely Dry Material.	Tannin in Absolutely Dry Material.
R. semialata	Leaves	5·98	7·26	2·77
R. semialata	Root bark	6·23	12·00	7·40
R. canadensis	Leaves	10·55	7·75	21·62

The leaves of the R. canadensis were collected in Tennessee in August, 1894. The purified tannin of the leaves showed:

	Per Cent.
Carbon	52·81
Hydrogen	3·17
Oxygen	44·02

It was noticed during the work on the lines of these several species of sumach that malic acid and acid malates interfere in the hide-powder process of estimating tannin by being taken up by the hide, thus immersing the figure for tannin. Neutral malates are not so absorbed, and were found to cause no interference in this manner.

Tannin of Ron Ron.—This material was procured from the Commercial Museum of Philadelphia. It is said to be the wood of a member of the Anacardiaceæ, which grows in Costa Rica.

The wood contained 6·87 per cent. of moisture, and upon ignition left an ash containing potassium and calcium carbonates and phosphates. The ash amounted to 1·58 per cent. of the thoroughly dried wood. The tannin of Ron Ron gave a yellow precipitate with bromine water, and a dark green precipitate with ferric alum. These characters ally it to the members of the oak bark tannin group. The air-dry wood contained 6·32 per cent. of tannin, which calculated for the absolutely dry wood equals 6·78 per cent.

CONIFERÆ.

Chamæcyparis Spheroidea.—A sample of the bark of the white cedar, Chamæcyparis spheroidea, was estimated, with the following result:

	Per Cent.
Moisture	34·75
Ash in absolutely dry bark	2·88
Tannin in absolutely dry bark	4·44

The sample was collected near Haddonfield, N. J., on June 21, 1894.

Taxodium Distichum.—A sample of the bark of Taxodium distichum was collected on June 28, 1895, at the Painter Arboretum,

situated about three to four miles northwest of Media, Pa. The bark was taken from the "knees;" it peeled easily. An estimation revealed the following quantities:

	Per Cent.
Moisture	13·17
Ash in absolutely dry bark	4·20
Tannin in absolutely dry bark	10·45

Juniperus Communis.—A nursery sample of Juniperus communis obtained near Philadelphia on March 15, 1896, showed the following percentages of tannin:

	Moisture.	Ash in Absolutely Dry Material.	Tannin in Absolutely Dry Material.
Root bark	5·97	6·77	7·71
Stem bark	5·95	6·49	5·66
Leaves	6·21	4·18	4·18

The ashes of the barks contained potassium and calcium as carbonates, phosphates and sulphates; the ashes of the leaves were free from sulphates, but in other respects they were the same as those from the barks.

Juniperus Virginiana.—The following collections of the stem bark of Juniperus virginiana were made at St. David's, Pa.

Date of Collection.	Moisture.	Ash in Absolutely Dry Bark.	Tannin in Absolutely Dry Bark.	Remarks.
May 12, 1894	5·50	5·30	5·60	
June 17, 1894	8·64	6 30	7·30	
July 29, 1894	25·28	6 86	8·28	
August 28, 1894	25·27	7·48	8·59	
October 3, 1894	8·24	4·06	3·59	Inner bark.
December 3, 1894	11·10	9·90	3·93	
January 14, 1895	9·00	9·78	3 56	
February 25, 1895	7·51	7·57	2·05	

The purified tannin of this bark gave the qualitative reactions of oak-tannin, and showed a composition of:

	Per Cent.
Carbon	60·87
Hydrogen	5·47
Oxygen	33·66

Larix Americana.—On August 15, 1895, Professor Bastin gathered

some bark from the branches of a Larix americana, growing in the Adirondack Mountains, New York. This was examined and found to yield 9·37 per cent. of moisture; 2·56 per cent. of ash in absolutely dry bark; and 13·98 per cent. of tannin in the thoroughly dried material.

A sample of bark collected from the branches by Professor Trimble at St. David's, Pa., on July 29, 1895, showed moisture, 13·05; ash in absolutely dry bark, 2·78, and tannin in absolutely dry bark, 8·79 per cent.

A nursery sample of the tree estimated in March, 1896, gave the following results:

	Moisture.	Ash in Absolutely Dry Material.	Tannin in Absolutely Dry Material.
Root bark	8·81	4·11	15·50
Stem bark	7·47	2·51	12·48
Leaves	6·51	5·73	8·89

Larix Europea.—Some bark of Larix europea was collected from the stem of a tree at St. David's, Pa., on January 30, 1896. It showed the following:

	Per Cent.
Moisture	5·75
Ash in absolutely dry bark	2·39
Tannin in absolutely dry bark	15·91

Pseudotsuga Taxifolia.—Two samples of the bark of Pseudotsuga taxifolia were estimated. One of these samples was from Klamath Falls, Ore., and the other from Forest Grove, in the same State. The former was collected about the first of January, 1897, and the latter on February 13, 1895. The results were as follows:

Sample.	Moisture.	Ash in Absolutely Dry Bark.	Tannin in Absolutely Dry Bark.
Klamath Falls	15·41	1·06	8·15
Forest Grove	5·34	1·49	14·05

The purified tannin from one of the samples gave the following figures when submitted to combustion:

	Per Cent.
Carbon	61·72
Hydrogen	5·73
Oxygen	32·55

Pinus Ponderosa.—Two samples of the bark of Pinus ponderosa, one from Klamath Falls, Ore., and the other from Colorado Springs

Col., were estimated. The first was collected in December, 1896, and the second in February, 1896. The figures were:

Sample.	Moisture.	Ash in Absolutely Dry Bark.	Tannin in Absolutely Dry Bark.
Klamath Falls	12·04	0·91	4·20
Colorado Springs	7·65	4·56	4·49

Taxus Canadensis.—Two samples of bark from Taxus canadensis were examined. One sample was collected at Perkiomen, Pa., on August 1, 1895, the other was gathered in the Adirondack Mountains, N. Y., on August 15, 1895. The results were:

Locality.	Moisture.	Ash in Absolutely Dry Bark.	Tannin in Absolutely Dry Bark.
Perkiomen	10·86	5·64	20·46
Adirondack	10·63	5·23	17·01

Thuja Gigantea and Thuja Occidentalis.—For the purpose of estimating the tannin in these trees, specimens were procured from a nursery near Philadelphia, on March 15, 1896. The results were as follows for Thuja gigantea:

	Moisture.	Ash in Absolutely Dry Material.	Tannin in Absolutely Dry Material
Root bark	6·70	5·14	10·71
Stem bark	6·93	6·10	8·16
Leaves	8·23	3·91	9·14

and for Thuja occidentalis:

	Moisture.	Ash in Absolutely Dry Material.	Tannin in Absolutely Dry Material.
Root bark	6·44	7·12	5·77
Stem bark	5·61	6·46	6·13
Leaves	7·68	4·89	5·85

The ashes of the leaves were composed of potassium and calcium carbonates and phosphates; those of the barks contained the same salts and, in addition, sulphates.

(*To be continued.*)

NICOTINE may be detected by the use of formaldehyde (30 per cent. solution) and concentrated sulphuric acid. A rose-red colored solution is produced with 0·005 gramme of the alkaloid.—*Pharm. Centralh.*, 1899, p. 703.

ON THE REPORTED PRODUCTION OF ARSENIC FROM PHOSPHORUS AND THE COMPOUND NATURE OF THE FORMER.

NOTE BY SAML. P. SADTLER, PH.D.

The announcement by Prof. F. Fittica, of Marburg, the well-known editor of the *Jahresbericht*, that he had succeeded in changing both the clear and the amorphous varieties of phosphorus into arsenic by following certain lines of treatment comes with something of a surprise to chemists.

Already near the beginning of this century the observation was made that, under the influence of ammonia, phosphorus, whether on exposure to light or when in the molten condition, passed into a so-called black modification, and in 1892 Flückiger showed that this was arsenic and nothing else. However, it was assumed that the arsenic had existed in the phosphorus as an impurity, and had merely separated out under this treatment.

The author soon found, on repeating the earlier experiments, that atmospheric oxidation was an essential part of the process yielding the result noted, and he then began the treatment of the phosphorus with ammonia in the presence of stronger oxidizing agents like hydrogen dioxide and with nitric acid alone and in conjunction with barium dioxide. Amorphous phosphorus was found to give better results than the clear variety.

The method finally chosen by which he succeeded in obtaining the maximum yield (8–10 per cent.) was the following: 2 grammes of amorphous phosphorus, free from arsenic, were heated on the sand bath with 12.9 grammes of finely powdered ammonium nitrate after being carefully mixed in a rather wide tube connected with a condenser, and the temperature gradually raised to 180° C. When the reaction begins care must be taken to moderate the heat, which, however, rises to about 200°. After allowing to cool, the contents of the tube, a fused grayish mass, are dissolved out, and, after filtering, hydrogen sulphide added. The yellow precipitate is dissolved in ammonium carbonate and the arsenic sulphide precipitated from the solution on addition of hydrochloric acid. Its identity is established by its conversion into arsenious acid and by Marsh's test.

The author gives a *provisional formula for arsenic*, PN_2O, according to which it is a nitrogen monoxide compound of phosphorus. Further communications are promised.

Prof. Clemens Winkler, of Freiburg, Saxony, publishes in the *Berichte der Deutschen Gesellschaft* for June 11th, which is just at hand, a review of Fittica's experiments and shows quite conclusively that the arsenic found is simply a constant impurity of the phosphorus, and, in four experiments, using different oxidizing agents, he gets 1·91, 1·925, 1·920 and 1·920 per cent. of arsenic. This uniformity, to his mind, shows the exact extent of the arsenic impurity originally present in the phosphorus used. So we still have to consider arsenic as an element.

RECENT LITERATURE RELATING TO PHARMACY.

PERIODIDE SEPARATION IN ALKALOIDAL ASSAY.

While Gordon and Prescott suggest a volumetric estimation of alkaloids through their periodides, Kippenberger (*Ap. Zeit.*, through *Ph. Cent.*, 1898, 903) has devised an assay wherein the alkaloids are separated as periodides and weighed free. His method is as follows: The preparation, freed from alcohol, is treated with an iodine solution (20 grammes iodine and 60 grammes potassium iodide to the litre), and the precipitate collected on a filter. This is washed with water (best containing a little sodium chloride, to avoid loss of the slightly soluble periodide), after which the precipitate is extracted with rectified acetone, the filtrate dropping into a funnel and repeatedly poured back over the precipitate.

The acetone solution of the periodide is shaken with an alkaline hydrate solution (which takes up the iodine), and then free hydrochloric acid is added in excess, and finally water is added. The mixed liquid is then shaken with petroleum ether, which extracts coloring matter, last traces of iodine and a large part of the acetone, and this mixture is separated from the aqueous layer, which is then freed from the remaining acetone by heating on a water-bath. Thereupon it is returned to the separatory funnel, diluted with water and made alkaline, and the free alkaloid extracted with chloroform.

The author claims that this method, which appears complicated and subject to error, gives good results. The article gives special directions for the preparation of each drug, for which the reader is referred to the original. H. V. A.

ASSAY OF BISMUTH SALICYLATE.

W. Kollo (*Ph. Post*, 1899, 2) has applied Thom's method (See A. J. P., 1899) of bismuth estimation to the salicylate, with satisfactory results, using for control experiment the extraction of the salicylic acid from the substance; as well as the separated weight of the bismuth oxide. He calls attention to an error in the usual directions of manufacture of the salicylate—that the precipitated salt be washed with water until the filtrate no longer gives a reaction with ferric chloride. This direction is, of course, intended to totally remove the free salicylic acid; but as traces of bismuth salicylate dissolve in the wash-water, it always gives the reaction with iron He amends the directions to read that the *ethereal extract* of the last washings should not show the ferric chloride reaction. H. V. A.

INDIRECT QUANTITATIVE ESTIMATION OF ALKALINE EARTHS.

Noting the difficulty in the quantitative separation of calcium, strontium and barium, Knoblauch (*Ph. Zeit.*, 1898, 922) devised a simple indirect method of estimation of any two of these elements based on the molecular weights of their oxides and carbonates. The process, briefly outlined, consists in the precipitation of the mixed elements as carbonates, and the conversion of these by heating with a given weight of borax glass. The weight of the mixed carbonates is the factor p; that of the oxides, the factor n, and the differential equations are as follows:

Calcium and barium:

$$CaO = 2{\cdot}00652915\ p - 2{\cdot}58283141\ n.$$
$$BaO = n - CaO.$$

Calcium and strontium:

$$CaO = 2{\cdot}7736936\ p - 3{\cdot}95263432\ n. \quad SrO = n - CaO.$$

Barium and strontium:

$$SrO = 7{\cdot}25463260\ p - 9{\cdot}33816773\ n. \quad BaO = n - SrO.$$

As the matter is of analytical rather than pharmaceutical interest, the reader is referred to the original for details, as well as for the author's method of estimation, when all three elements are present.

H. V. A.

BISMUTUM OR BIMUSTHUM?

In defense of the orthography of the German pharmacopœial term bismutum, T. Husemann (*Ph. Zeit.*, 1898, 895) gives a highly inter-

esting sketch of the etymology of the word, in which he lays special stress on the fact that the word is of German-Latin origin and that to these two languages the combination "th" is foreign. His authorities may be outlined as follows:

Unknown author, "Berg büchlein"	1518–1539	Wissmath.
" " "Ursprung von Bergrecht"	1532	Wissmat.
Georg Agricola	1539 1546	Bisemutum. Bismut.
Encelius	1551	Wisemut. Wyssmut. Wyssmuth.

The "h" in the latter is evidently a typographical error, as both forms occur.

Keatmann	1565	Wissmut. Wismut.
Fabricius	1565	Bismuth. Wismuth.
Libavius	1597	Bismuthum.
Ruland	1612	Wismat.
Schroeder's Pharmacopœia	1641	Bismuthum. Bismutum.
Reprint of Valentinus	1677	Wismut. Wismuht.
"Museum Wormianum"	1694	Wismut.
"Bergwerks Lexicon"	1743	Wismuth.
Linné	1787	Wismuthum. Vismuthum.

The English word has been "bismuth" since earliest reference (1715). The French have used "bismuth" and "bismut," the former being the earliest in notice (1694). The supposed derivation of the word from "wiese-matie" is characterized as a pretty fable, the real origin not being known. H. V. A.

VALUATION OF INSECT POWDER.

The most plausible methods of valuation of the commodity are based on amount, appearance and odor of the extract afforded by percolation with ether, chloroform or petroleum ether.

F. Dietze (*Ph. Zt.*, 1899, 196) makes a comparison of the several methods, and has decided that the best results are secured by the use of petroleum ether, boiling under 55° C. The percolate from pure insect powder, when such menstruum is employed, is bright yellow, and possesses the peculiar odor of the powder. The writer further urges that all valuations should be accompanied by physiological tests on the insects themselves. H. V. A.

PARAGUAY TEA.

The leaves of Ilex paraguayensis are the subject of an interesting paper by P. Seidler (*Süddtsch. Ap. Zeit.*, 1898, 724).

He states that the tea industry is conducted by companies, the largest being an English concern, which has a capital of 5,000,000 sterling.

The product is obtained from wild plants, which are evergreen, and sometimes 25 feet high, growing on tracts obtained by governmental concession. The collection is from May to September, and is performed by Indians directed by white overseers.

The various grades are: (1) The leaves of young shoots; (2) leaves from branches of preceding year; (3) leaves of old branches dried over a fire. In packing all three varieties, some branches are added to give the drink a slight astringency.

The physiological effect of the infusion, which is called *mate*, not *maté* (from utensil in which prepared), is similar to tea or coffee, without affecting the digestion as they do. H. V. A.

THE CELLULAR TISSUE OF GENTIAN.

The researches of Bourquelot and Hérissey, on Gentian, have reached the cellular membrane. The authors report (*Jour. de Pharm. et Chim.*, 1899, 330) that the drug, after exhaustion with hot water, boiling alcohol and sulphuric acid heated to boiling, leaves a residue, which represents almost pure cellulose. This is susceptible to hydrolysis, when 25 grammes are macerated with 125 grammes sulphuric acid and 40 grammes distilled water for twenty-four hours. The liquid is then diluted to 1,000 c.c. and filtered, the filtrate washed with 2½ per cent. sulphuric acid until filtrate measures 5,000 c.c., is then neutralized with calcium carbonate, condensed to 400 c.c. and then filtered to removed calcium sulphate. This filtrate is evaporated to a syrup and crystallized with aid of alcohol. The product on purification with alcohol shows all the characteristics of dextrose. H. V. A.

THE VARIATION IN THE COMPOSITION OF "PARIS GREEN," WITH SCHEME FOR ANALYSIS.

Thomas B. Stillman, in concluding a paper (*Chem. News*, 1899, p. 261) on the chemical examination of Paris green, gives a number of important references to the literature of the subject, and gives the accompanying scheme of analysis, which includes all varieties of Schweinfurth green.

SCHEME FOR ANALYSIS OF "PARIS GREEN," CONTAINING $BaSO_4$, $PbSO_4$, $3CuOAsO_3Cu(C_2H_3O_2)_2$, $PbCrO_4$, ZnO, and $CaCO_3$.

Add Excess of Dilute Nitric Acid, Warm, Filter and Wash Well with Hot Water.

<table>
<tr><td colspan="2" rowspan="2">Residue { $BaSO_4$, $PbSO_4$.
Transfer to a No. 3 beaker, add excess of a saturated solution of ammonic acetate; warm ten minutes, filter, wash with hot water.</td><td colspan="6">Solution.—Add slight excess of dilute H_2SO_4, evaporate nearly to dryness, allow to cool, add dilute H_2SO_4, warm, filter and wash well with water.</td></tr>
<tr><td rowspan="4">Residue,
$PbSO_4$.
Dry, ignite and weigh as $PbSO_4$, and calculate to $PbCrO_4$.</td><td colspan="5">olution.—Pass H_2S gas through the liquid to saturation, keeping the temperature of the solution at about 70° C. Filter, wash with water containing H_2S.</td></tr>
<tr><td rowspan="3">Residue,
$BaSO_4$.
Dry, ignite and weigh as $BaSO_4$</td><td rowspan="3">Solution.
Add excess of dilute H_2SO_4, evaporate to dryness; add dilute H_2SO_4, warm, filter, wash with hot water, dry, ignite and weigh as $PbSO_4$.</td><td colspan="2">Residue,
CuS As_2S_3.
Transfer to a No. 3 beaker, add excess of strong solution of sodium sulphide, warm gently ten minutes, filter, wash with water.</td><td colspan="3">Solution.—Boil to expel the H_2S, make alkaline with ammonic hydrate (a), warm, filter, wash well with hot water.</td></tr>
<tr><td rowspan="2">Residue.
CuS.
Dissolve in nitric acid, dilute with water, filter off any separated sulphur, and determine copper by electrolysis. (See "Stillman's Engineering Chemistry," p. 5.)</td><td rowspan="2">Solution.
Acidify with HCl, pass H_2S gas to saturation, filter, wash with H_2S water, and determine arsenic by method of Kessler. (See "Sutton's Volumetric Analysis," p. 138.)</td><td rowspan="2">Residue,
$Cr_2(OH)_6$.
Dry, ignite and weigh as Cr_2O_3. Calculate to—
$PbCrO_4$.
This weight should equal the weight of $PbCrO_4$ found by determination of the lead in Column 3.</td><td colspan="2">Solution.—Pass H_2S gas to saturation, filter, wash with water containing a few drops of ammonic sulphide.</td></tr>
<tr><td>Residue,
ZnS.
Dissolve precipitate in HCl, dilute with water, boil, add gradually slight excess of sodium carbonate; boil three minutes, filter, wash thoroughly with hot water, dry, ignite, and w igh as ZnO.</td><td>Solution.
Boil to expel the H_2S, add a few drops of ammonic hydrate, then excess of solution of ammonic oxalate. Set aside two hours, filter, wash with water containing $\frac{1}{10}$ volume of ammonic hydrate, dry, ignite, and weigh as CaO, and calculate to $CaCO_3$.</td></tr>
<tr><td>$BaSO_4$.</td><td>$PbSO_4$.</td><td>$PbCrO_4$.</td><td>Cu.</td><td>As_2O_3.</td><td>$PbCrO_4$.</td><td>ZnO.</td><td>$CaCO_3$.</td></tr>
</table>

(a) If a white precipitate forms, of zinc hydroxide, add ammonic hydrate until it dissolves. If it be desired to determine the acetic acid, another portion of the Paris green should be taken and tested by C. Mohr's process. (Consult page 82, "Sutton's Volumetric Analysis.")]

PHILADELPHIA HOSPITAL FORMULARY.

(*Continued from page 234.*)

Mistura Camphoræ.

Each tablespoonful contains :

Tr. Opium, Deod.,	5 m.	0·3 c.c.
Acid, Nitrous, Fuming	4 m.	0·24 c.c.
Water, Camphor, to measure	4 fl. dr.	15 c.c.

Dose : Tablespoonful.

Hope.

Mistura Cardiaca.

Each teaspoonful contains :

Solution, Nitro-glycerin (1 per cent.)	1 m.	0·06 c.c.
Tr. Belladonna	1 m.	0·06 c.c.
Tr. Digitalis	5 m.	0·3 c.c.
Tr. Strophanthus	2 m.	0·12 c.c.
Water, Chloroform, to measure	1 fl. dr.	4 c.c.

Dose : Teaspoonful.

J. M. DaCosta.

Mistura Cascara.

Each teaspoonful contains :

Ext. Cascara Sag., Fl.,		
Inf. Sarsap., Comp.,		
Glycerin, of each	20 m.	1·25 c.c.

Dose : One teaspoonful or more, in water.

Mistura Codeinæ et Chloroformi.

(C—C. Mixture.)

Each teaspoonful contains :

Codeine Sulphate	⅛ gr.	0·008 gm.
Acid, Hydrocyanic, Dilute	1·5 m.	0·1 c.c.
Spts. Chloroform	15 m.	1 c.c.
Glycerin	10 m.	0·65 c.c.
Ext. Wild Cherry, Fl.,	5 m.	0·3 c.c.
Elixir, Orange, to measure	60 m.	4 c.c.

Dose : Teaspoonful, in water.

J. W. E.

Mistura Creosoti.

Each dessertspoonful contains :

Creosote, B. W.	2 m.	0·12 c.c.
Glycerin	30 m.	2 c.c.
Elixir, Orange	30 m.	2 c.c.
Alcohol	30 m.	2 c.c.
Oil, Almonds, Bitter	1 drop.	0·03 c.c.
Tr. Cardamom, Comp., to measure	2 fl. dr.	8 c.c.

Dose : Two to four teaspoonfuls 3 to 5 times a day.

Mistura Diuretica.

Each dessertspoonful contains:

Potass. Citrate	10 gr.	0·6 gm.
Potass. Acetate	10 gr.	0·6 gm.
Spts. Ether, Nitrous	15 m.	1 c.c.
Sol. Ammon. Acet.	1 fl. dr.	4 c.c.
Syrup, Acid, Citric, to measure	2 fl. dr.	8 c.c.

Dose: Dessertspoonful.

Mistura Diuretica Cum Digitale.

Each dessertspoonful contains:

Potass. Citrate	10 gr.	0·6 gm.
Potass. Acet.	10 gr.	0·6 gm.
Spts. Ether, Nit.	15 m.	1 c.c.
Sol., Ammon., Acet.	1 fl. dr.	4 c.c.
Tr. Digitalis	5 m.	0·3 c.c.
Syrup, Acid, Citric, to measure	2 fl. dr.	8 c.c.

Dose: Dessertspoonful.

Mistura Dysenterica.

(Saline Dysenteric Mixture.)

Each dessertspoonful contains:

Magnes. Sulph.	20 gr.	1·3 gm.
Ac. Sulph. Dil.	10 m.	0·6 c.c.
Tr. Opium, Deod.	10 m.	0·6 c.c.
Water, Chloroform, to measure	2 fl. dr.	8 c.c.

Dose: Dessertspoonful.

Mistura Enterica.

Each teaspoonful contains:

Chloroform	5 m.	0·3 c.c.
Tr. Capsicum	5 m.	0·3 c.c.
Ac. Sulphuric, Aromat.	10 m.	0·6 c.c.
Spts. Camphor	10 m.	0·6 c.c.
Tr. Opium, Deod.	10 m.	0·6 c.c.
Spts. Wine, Gallic, to measure	1 fl. dr.	4 c.c.

Dose: One teaspoonful.

Mistura Expectorans.

Each dessertspoonful contains:

Acid, Hydrocyanic, Dil.	1 m.	0·06 c.c.
Spts. Chloroform	10 m.	0·6 c.c.
Acid, Hydrobromic (34 per cent.)	7·5 m.	0·5 c.c.
Syrup, Senega	10 m.	0·6 c.c.
Syrup, Squill	15 m.	1 c.c.
Syrup, Wild Cherry, to measure	2 fl. dr.	8 c.c.

Dose: Dessertspoonful.

Mistura Ferri Aperiens.

Each tablespoonful contains :

Ferrous Sulphate	1 gr.	0·65 gm.
Magnesium Sulphate	60 gr.	4 gm.
Acid, Sulphuric, Dil.	7·5 m.	0·5 c.c.
Syrup, Ginger	1 fl. dr.	4 c.c.
Inf. Quassia, to measure	4 fl. dr.	15 c.c.

Dose : Tablespoonful.

Mistura Ferri et Ammonii Acetatis.

(Basham's Mixture.)

Each tablespoonful contains :

Tr. Ferric Chloride	10 m.	0·6 c.c.
Acid, Acetic, Dilute	15 m.	1 c.c.
Sol. Ammonium Acetate	2 fl. dr.	8 c.c.
Elixir, Orange	30 m.	2 c.c.
Glycerin	30 m.	2 c.c.
Water, to measure	4 fl. dr.	15 c.c.

Dose : Tablespoonful.

Philadelphia Hospital.

P. S.—Under the name, at first, of "Mistura Ferri Chloridi Composita," the above formula, in its essential ingredients, has been used in the Philadelphia Hospital since 1875, and possibly earlier. It is thought to be the original formula of Dr. W. K. Basham, of Westminster Hospital, London, and differs radically from the watery product of the U. S. Pharmacopœia of 1890 (Liquor Ferri et Ammonii Acetatis), which represents, in each tablespoonful, only about 5 minims of Tincture of Ferric Chloride, and 48 minims of Solution of Ammonium Acetate.

Mistura Ferri Salicylatis.

Each teaspoonful contains :

Sodium Salicylate	7·5 gr.	0·5 gm.
Glycerin	15 m.	1 c.c.
Mucilage, Acacia	7·5 m.	0·5 c.c.
Tr. Ferric Chlor.	7·5 m.	0·5 c.c.
Oil, Gaultheria	½ m.	0·03 c.c.
Solution, Ammonium, Citrate (B.P.), to measure	1 fl. dr.	4 c.c.

Dose: One to two teaspoonfuls.

S. Solis Cohen.

Mistura Ferri Phosphatis.

(Iron Lemonade.)

Each teaspoonful contains :

Tr. Ferric Chloride	10 m.	0·6 c.c.
Acid, Phosphoric, Dilute	10 m.	0·6 c.c.
Glycerin	15 m.	1 c.c.
Syrup, Acid, Citric, to measure	1 fl. dr.	4 c.c.

Dose : One to two teaspoonfuls.

Mist. Ferri et Potass. Chloratis.

(Iron Gargle.)

Tr. Ferric Chloride	2 fl. dr.	8 c.c.
Acid, Acetic	15 m.	1 c.c.
Sol. Ammon. Acet.	4 fl. dr.	15 c.c.
Sol. Potass. Chlorate, Sat.	4 fl. oz.	120 c.c.
Glycerin	3 fl. dr.	12 c.c.
Water, Peppermint, to measure	8 fl. oz.	240 c.c.

Gargle.

Mist. Ferri et Quininæ Phosphatis.

Each tablespoonful contains:

Quinine Sulphate	2·5 gr.	0·15 gm.
Acid, Phosphoric, Dil., sufficient.		
Iron Pyrophos. Sol.	2·5 gr.	0·15 gm.
Glycerin	30 m.	2 c.c.
Elixir, Orange	1 fl. dr.	4 c.c.
Sol. Ammon. Acet., sufficient.		
Water, to measure	4 fl. dr.	15 c.c.

Dose: Tablespoonful.

Mistura Gentianæ Acida.

Each tablespoonful contains:

Acid, Nitrohydrochloric, Dilute	10 m.	0·6 c.c.
Inf. Gentian, Co., to measure	4 fl. dr.	15 c.c.

Dose: Tablespoonful.

Mistura Nucis Acida.

(Acid Nux Mixture.)

Each teaspoonful contains:

Acid, Hydrochloric, Dilute	10 m.	0·6 c.c.
Tr. Nux Vomica	10 m.	0·6 c.c.
Tr. Pepper, Black	5 m.	0·3 c.c.
Glycerin	5 m.	0·3 c.c.
Inf. Gent., Comp., to measure	1 fl. dr.	4 c.c.

Dose: Teaspoonful.

Mistura Pectoralis.

Each dessertspoonful contains:

Ammonium Chloride	5 gr.	0·3 gm.
Spts. Ammon., Aromat.	2 m.	0·12 c.c.
Syr. Senega	10 m.	0·6 c.c.
Mixt. Liquorice, Comp., to measure	2 fl. dr.	8 c.c.

Dose: Dessertspoonful to tablespoonful.

Mistura Pepsinæ et Strychninæ.

Each teaspoonful contains:

Strychnine Sulph.	$\frac{1}{64}$ gr.	·001 gm.
Pepsin, Scaled	2·5 gr.	·015 gm.
Acid, Hydrochloric, Dilute	5 m.	0·3 c.c.
Tr. Card., Comp.	10 m.	0·6 c.c.
Water, to measure	1 fl. dr.	4 c.c.

Dose: One to two teaspoonfuls.

Mistura Pilocarpinæ, Sparteinæ et Digitalis.

Each dessertspoonful contains :

Pilocarpine Nitrate	$\frac{1}{16}$ gr.	0·004 gm.
Sparteine Sulphate	¼ gr.	0·016 gm.
Water, Chloroform,		
Infusion, Digitalis, of each, to measure	2 fl. dr.	8 c.c.

Dose : Dessertspoonful.

D. E. H.

Mistura Sodæ.

(Soda Mint.)

Each tablespoonful contains :

Sodium Bicarbonate	10 gr.	0·6 gm.
Spts. Ammon., Aromat.	7·5 m.	0·5 gm.
Water, Peppermint, to measure	4 fl. dr.	15 c.c.

Dose : Tablespoonful.

Philadelphia Hospital.

Mistura Sodæ et Rhei.

Each dessertspoonful contains :

Sodium Bicarbonate	3 gr.	0·2 gm.
Tr. Capsicum	2 m.	0·12 c.c.
Tr. Nux Vomica	5 m.	0·3 c.c.
Tr. Rhubarb	30 m.	2 c.c.
Water, Peppermint, to measure	2 fl. dr.	8 c.c.

Dose : Dessertspoonful to tablespoonful.

Mistura Terebeni.

Each teaspoonful contains :

Terebene	3 m.	0·2 c.c.
Oil, Gaultheria	1 m.	0·06 c.c.
Acacia, sufficient.		
Syrup, Wild Cherry, to measure	1 fl. dr.	4 c.c.

Dose : One or two teaspoonfuls in water.

Mistura Zollickofferi.

(Zollickoffer's Mixture.)

Each tablespoonful contains :

Potassium Iodide	10 gr.	0·6 gm.
Resin, Guaiac	5 gr.	0·3 gm.
Wine, Colchicum Root	15 m.	1 c.c.
Acacia, Powd., sufficient.		
Water, Cinnamon,		
Syrup, Ginger, of each, to measure	4 fl. dr.	5 c.c.

Dose : Tablespoonful.

OLEA.

Oleum Carbolatum.

Acid, Carbolic	2·5 per cent.
Oil, Olive	97·5 per cent.

Philadelphia Hospital.

Oleum Lini et Calcis.

(Carron Oil.)

Oil, Linseed,
Water, Lime, of each, equal volumes.

PILULÆ.

Pilulæ Aloini, Belladonnæ et Nucis Vomicæ.

Each pill contains :

Aloin	**1/5 gr.**	**0·013 gm.**
Ext. Belladonna	**1/8 gr.**	**0·008 gm.**
Ext. Nux Vomica	**1/8 gr.**	**0·008 gm.**

Pilulæ Aloini, Belladonnæ et Nucis Vomicæ Comp.

Each pill contains :

Aloin	**1/5 gr.**	**0·013 gm.**
Ext. Belladonna	**1/8 gr.**	**0·008 gm.**
Ext. Nux Vomica	**1/8 gr.**	**0·008 gm.**
Ext. Cascara Sagrada	**1 gr.**	**0·065 gm.**

Dose : One pill.

Pilulæ Antipyreticæ.

Each pill contains :

Powd. Opium	**1/4 gr.**	**0·016 gm.**
Powd. Ipecac	**1/4 gr.**	**0·016 gm.**
Powd. Digitalis	**1/2 gr.**	**0·032 gm.**
Quinine Sulphate	**1 gr.**	**0·065 gm.**

Dose : One pill every six hours. **Niemeyer.**

Pilulæ Argenti et Opii.

Each pill contains :

Silver Nitrate	**1/8 gr.**	**0·008 gm.**
Powd. Opium	**1 gr.**	**0·065 gm.**

Dose : One to two pills.

Pilulæ Arsenicales.

Each pill contains :
Acid Arsenous,

1/64 gr.	**1/48 gr.**	**1/32 gr.**	**1/24 gr.**
= 0·001 gm.	**0·0015 gm.**	**0·002 gm.**	**0·003 gm.**

Dose : One pill.

Pilulæ Arsenici et Cinchoninæ.

Each pill contains :

Acid Arsenous	**1/24 gr.**	**0·003 gm.**
Ext. Nux Vomica	**1/4 gr.**	**0·016 gm.**
Cinchonine Sulphate	**2 gr.**	**0·13 gm.**
Mass, Ferrous Carbonate	**2 gr.**	**0·13 gm.**

Dose : One pill.

Pilulæ Arsenici, Strychninæ et Ferri.

Each pill contains:

Acid Arsenous	$\frac{1}{21}$ gr.	0·003 gm.
Strychnine Sulphate	$\frac{1}{42}$ gr.	0·0015 gm.
Iron, Reduced	1 gr.	0·065 gm.

Dose: One pill.

Pilulæ Arsenici, Strychninæ et Quininæ.

Each pill contains:

Acid Arsenous	$\frac{1}{21}$ gr.	0·003 gm.
Strychnine Sulphate	$\frac{1}{42}$ gr.	0·0015 gm.
Quinine Sulphate	2 gr.	0·13 gm.

Dose: One pill.

Pilulæ Creosoti.

Each pill contains:

Creosote, Beechwood,

1 m.	2 m.
= 0·06 c.c.	0·12 c.c.

Dose: One or more pills.

Pilulæ Cupri Compositæ.

Each pill contains:

Copper Sulphate	$\frac{1}{8}$ gr.	0·008 gm.
Powd. Opium	$\frac{1}{8}$ gr.	0·008 gm.
Ext. Nux Vomica	$\frac{1}{8}$ gr.	0·008 gm.

Dose: One every three or four hours.

Pilulæ Ferri Carbonatis.

(Blaud's Pills.)

Each pill contains:

Mass, Ferrous Carbonate	3 gr.	0·2 gm.
Potass. Sulphate	2 gr.	0·13 gm.
Potass. Carbonate	$\frac{1}{3}$ gr.	0·02 gm.

Acacia,

Althæa, of each, sufficient.

Dose: One or more pills. J. W. E.

Pil. Ferri, Quininæ et Strychninæ.

Each pill contains:

Iron Pyrophos.	1·5 gr.	0·1 gm.
Quinine Sulphate	1 gr.	0·065 gm.
Strychnine Sulphate	$\frac{1}{64}$ gr.	0·001 gm.

Dose: One to two pills.

Pilulæ Hepaticæ Compositæ.

Each pill contains:

Powd. Ipecac	$\frac{1}{3}$ gr.	0·02 gm.
P. Black Pepper	1 gr.	0·065 gm.
Sodium Bicarb.	3 gr.	0·2 gm.
Mass, Mercurial	3 gr.	0·2 gm.

Dose: One every two hours after supper until three are taken, followed in the morning, before breakfast, by a saline purgative. J. W. E.

Pilulæ Hydrargyri Chloridi Corrosivum.

Each pill contains:

Mercuric Chloride, Corrosive,

$\frac{1}{20}$ gr.	$\frac{1}{16}$ gr.	$\frac{1}{12}$ gr.
= 0·003 gm.	0·004 gm.	0·005 gm.

Dose: One pill.

Pilulæ Hydrargyri Iodidi Flavi.

Each pill contains:

Mercurous Iodide, Yellow,

$\frac{1}{8}$ gr.	$\frac{1}{4}$ gr.	$\frac{1}{2}$ gr.
= 0·008 gm.	0·016 gm.	0·032 gm.

Dose: One pill.

Pilulæ Plumbi et Opii.

Each pill contains:

Extract, Opium	$\frac{1}{4}$ gr.	0·016 gm.
Lead Acetate	2 gr.	0·13 gm.

Dose: One to two pills.

Pilulæ Purgativæ Compositæ.

Each pill contains:

P. E. Colocynth Comp.	1·25 gr.	0·08 gm.
Mercurous Chloride, Mild	1 gr.	0·065 gm.
Ext. Jalap	$\frac{1}{2}$ gr.	0·032 gm.
Gamboge	$\frac{1}{4}$ gr.	0·016 gm.
Ext. Hyoscyamus	$\frac{1}{8}$ gr.	0·008 gm.
Oil, Peppermint	$\frac{1}{16}$ m.	0·004 c.c.

Dose: Three or four pills.

Pilulæ Quininæ.

Each pill contains:

Quinine Sulphate,

1 gr.	2 gr.	3 gr.	5 gr.
= 0·065 gm.	0·13 gm.	0·2 gm.	0·3 gm.

Dose: One pill.

Pilulæ Thymol.

Each pill contains:

Thymol	3 gr.	0·2 gm.
Powd. Soap	1·5 gr.	0·1 gm.

Dose: One pill.

EDITORIAL.

THE RETAIL PHARMACIST AND THE AMERICAN PHARMACEUTICAL ASSOCIATION.

There are many people who look upon life as being an existence, characterized for the most part by struggle and dissension. They say, for instance, that in the human body there is a struggle among the cells, and that in this struggle there are not only evidences of life, but there is life. And so in the world about us, they speak of

a struggle for a material existence, and would have us believe that in order that there be life there must be a fight continually going on. No one can deny that every organism has a struggle for existence, but no one can say that in this struggle we have the only factor that produces any lasting benefit. In the living world it is not so much strife as the proper co-ordination of the functions of the different cells and different organs in the organism which conduce to the production of the best results. In the social world every one is beginning to recognize the truth of the saying, "give and take." The capitalist recognizes that in order to produce and keep his wealth it is not only necessary for him to look carefully after his employees during their working hours, but even afterwards. The result is that in the very largest and best regulated establishments there are evidences of the proper co-ordination of all the forces—not only are the members of the firm wealthy, but the employees are also prosperous.

The same thing applies also to our various organizations. The membership is made up of those who in many cases have apparently diverse interests. And yet when we look at their actions carefully we cannot but see that they all have the interests of the association to which they belong at heart, and the most successful associations are those in which no one section suffers, but in which there is a proper co-ordination of the efforts of the various committees and workers. In a still larger sense this may also be said of the various separate organizations espousing particular fields of work, such as those interested in pharmacy, medicine, etc.

There are some persons who have criticised the A.Ph.A. as not being sufficiently scientific; whereas there are others who speak of it as an association for manufacturers and teachers; and still others who think that the retail pharmacist should be "the power behind the throne." The fact is none of these persons are justified in their claims or their criticisms. The A.Ph.A. is the one organization that ought to be sufficiently representative to include all those in any wise interested in pharmacy. It is big enough for the retail pharmacist, the manufacturer and the teacher. And it is indeed significant that this year the President and the chairmen of two sections are retail pharmacists, the chairmen of the other two sections being teachers. At the last meeting of the Association the chairmen of the different sections as well as the President of

the Association were teachers. A year ago, the President and the Chairman on Pharmaceutical Education and Legislation were manufacturing pharmacists; the Chairman of the Commercial Section was a retail pharmacist, and the Scientific Section only was represented by a teacher.

It was the President at the last meeting of the Association who said: "The interests of the wholesaler, the manufacturer, dispenser and teacher are in common;" and it was the chairman of the Commercial Section who said "unless there be a commercial side to pharmacy, the professors will soon be without students to instruct."

Surely these are not merely sentiments, for when it has come to the election of officers it has always been the desire of the members of the Association to share honors and power with every representative of legitimate modern pharmacy. In former years the retail pharmacist controlled everything, but, as was pointed out in a recent editorial in this JOURNAL, times have changed, and in this age of specialization it is not possible for any one man to be at the same time wholesaler, manufacturer, dispenser and teacher. Every one must recognize from the very nature of the case that these different divisions of pharmacy furnish distinct lines of work. Yet it will be found that ultimately their interests are in common, and hence should be represented by some one organization as the American Pharmaceutical Association. No one class of workers can fail ultimately to be other than benefited by the industry of another class. If the scientific section seems to be crowding out the retail pharmacist, then it is his place to see that there is some place in the organization for him to discuss the problems of peculiar interest to him. In other words, if the members of any one section exhibit an unusual degree of activity, then this should be a stimulus to the workers in other sections rather than a hindrance to their efforts.

Furthermore, if a section is derelict in its duties or fails in a measure in fulfilling all the needs for which it was, to a certain extent, created, we need not wonder even if a rival association be organized. President Dohme said in his address last year to the A.Ph.A., in regard to the work of the National Association of Retail Druggists: "The very good work the N.A.R.D. has accomplished could, in all probability, have been accomplished as effectually by the A.Ph.A., provided the right men had been found to take

the work in hand, and if the membership had been increased to make it a still more representative body of American pharmacists. Had the men who now dominate, lead and push the N.A.R.D. been members of the A.Ph.A., and taken hold of our commercial section as they have that of the N.A.R.D., the same results would have been achieved."

This new organization has benefited the A.Ph.A. to the extent of stimulating its activity more than ever in putting forth efforts for securing membership of retail druggists. Fortunately, wisdom and good sense seem to prevail, and there is every indication of the co-ordination of the interests of the two associations.

It was evidently the design of the founders of the A.Ph.A. that that organization benefit in every way the retail pharmacist. They builded, however, better than they knew. Instead of calling it "The American Apothecaries' Association," they called it the "American Pharmaceutical Association." For, while in this naming the object of the organization remained the same, yet it furnished an opportunity for growth, so that the greatest possible good might be rendered pharmacy at large. Pharmacy and medicine, like science proper, have become so specialized that there is an evident need of the American Medical Association and the American Pharmaceutical Association as well as the American Association for the Advancement of Science. Each with its various sections contributes ultimately to the welfare of science, medicine and pharmacy.

Let the members of the A.Ph.A. rise on the waves of progress, and enter the harbor of the new pharmacy with the new century, and let each see to it that he lives up to Article I of the Constitution, which it might be well, in the interests of pharmacy and the Association, to print in large type on cardboard and distribute among the retail pharmacists of the United States.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Die Rohstoffe des Pflanzenreiches. Versuch einer technischen Rohstofflehre des Pflanzenreiches von Dr. Julius Wiesner. Zweite gänzlich umgearbeitete und erweiterte Auflage. 2. Lieferung (Bogen 11–20) and 3. Lieferung (Bogen 21–30). Leipzig: Wilhelm Engelmann. 1900.

Since the review of the first Lieferung of this work of Wiesner

two other parts have appeared. The second Lieferung is devoted entirely to the resins. In Lieferung 3. the resins are concluded. Besides this there is a new chapter on caoutchouc-yielding plants, which has been worked over by K. Mikosch; two on opium and aloe, which are treated by A. E. Vogl; one on indigo, by H. Molisch; one on the catechu group, by K. Mikosch, and an unfinished chapter on the plant fats by the same author. An extended review of such a comprehensive work is impossible here.

All that was said in the review of the first Lieferung (see April number of this Journal) is fully justified, and we can safely say that no botanist or chemist or any other student who is interested in the plant constituents from any standpoint can afford to be without this new edition.

Annual and Analytical Cyclopædia of Practical Medicine, by Charles E. de M. Sajous and 100 associate editors, assisted by corresponding editors, collaborators and correspondents. Illustrated with chromo-lithographs, engravings and maps. Vol. V. Philadelphia: F. A. Davis Company. 1900.

Besides the articles on strictly medical topics, this volume is of great value by reason of the paper on "Nursing and Artificial Feeding," by L. E. Holt and L. E. La Tétra. This is a complemental paper to the one published in Vol. IV on "Diarrhœal Diseases of Infants," by Dr. Blackader. There can be no question that the mortality among infants during the summer months would be greatly reduced if the teachings of these articles were carefully considered and practically carried out.

Plant Names, Scientific and Popular. Compiled from the most authentic sources by A. B. Lyons. Detroit: Nelson, Baker & Co. 1900.

This book includes in the case of each plant the correct botanical name, in accordance with the reformed nomenclature, together with botanical and popular synonyms and vernacular German, French and Spanish names. The list comprises all important medicinal plants with their pharmacopœial names, the principal food plants of the world and all others of any economic importance, giving special prominence to those which are indigenous to the United States. A copious index serves as a key to this mass of information, enabling the reader to turn quickly to the desired paragraph.